REMARKS

Claims 1-22 and 24-36 remain pending in the present application. Claim 23 has been cancelled. Claims 1-22 and 24-33 have been amended. Claims 34-36 are new. Basis for the amendments and new claims can be found throughout the specification, claims and drawings originally filed.

SPECIFICATION

The disclosure is objected to because of informalities. The references have been added to the specification. Withdrawal of the objection is respectfully requested.

The drawings are objected to under 37 CFR 1.83(a). Paragraph [0047] of the U.S. publication defines a roll valve may be provided to interconnect the two front compression chambers and/or the two back compression chambers. Claim 23 has been cancelled and Claim 22 has been amended to define at least one of the two front and two back compression chambers. Withdrawal of the objection is respectfully requested.

Claim 4 defines that the first modal resistance volume thereby becomes a front bump resilience volume and a second modal resilience volume thereby becomes a back bump resilience volume. The "bump resilience" volumes (which are only one of two possible incarnations of the modal resilience volumes) each comprises a combination of two pitch chambers (e.g. 93 and 94 in figure 1) and the passage that interconnects those (101 in figure 1). Because these chambers and passages are described and labeled individually within the specification and the associated drawing (figure 1), we believe that it is unnecessary to create an additional label for a volume which is created by a combination of already labeled components. We have amended the specification to be

consistent with the claim terminology. Withdrawal of the objection is respectfully requested.

CLAIM OBJECTIONS

The current claim numbering was a result of amending the PCT claims to eliminate multiple dependent claims.

REJECTION UNDER 35 U.S.C. § 112

Claim 4 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicants have added this term to the specification. Reconsideration of the rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-5, 7 and 33 are rejected under 35 U.S.C. § 102(e) as being anticipated by Kobayashi (U.S. Pat. No. 7,210,688). Applicants respectfully traverse this rejection.

The Examiner states that Kobayashi discloses a damping and stiffness system having all the features of Claim 1 of the present invention. Each paragraph in Claim 1 has a point number in the Examiner's report making it easy to identify the sections of the claim.

It is immediately clear from points 10 and 16 of the Office Action (relating to the first and last paragraphs of present Claim 1 respectively) that the present invention includes "*front and rear vehicle resilient support means between the vehicle body and*

the wheel assemblies for resiliently supporting the vehicle above the wheel assemblies" and *"wherein the vehicle is primarily supported by the vehicle resilient support means".*

Nowhere in Kobayashi is there any mention of resilient support means which provide the primary support of the vehicle body.

The only resilience described is the springs in the various modal devices, and each of those springs acts through the hydraulic system requiring the wheel rams to provide enough "push-out" force to support the vehicle.

The present invention is distinguished by the feature of utilizing separate support springs which provide the primary support for the vehicle body. This feature provides (as described in the specification, for example in the published PCT on page 8, line 22 to page 9, line 29 and page 14, line 23 to page 15, line 7) the significant advantage that the hydraulic system does not support significant weight of the vehicle which means that each hydraulic fluid volume does not need to be individually controlled to a high pressure which is a major cost saving over the prior art. This also allows the hydraulic system to be engineered for a lower pressure rating which also significantly reduces costs. These disadvantages of the prior art are also described in the background of the invention (published PCT page 1, lines 14-21).

Also in point 13 of the Office Action, the definition of two distinct modal resilience volumes (both partially formed by the first piston rod and both partially formed by the second piston rod) of the present invention are not taught or disclosed in Kobayashi. Furthermore, the system disclosed in Kobayashi is not configured to operate utilizing those features. Simply, those features are not applicable to a system as described and shown in Kobayashi.

Furthermore, explicitly, Kobayashi does not disclose or teach the following features of Claim 1 of the present invention:

- *Third and fourth effective areas define movable walls of first and second modal resilience volumes*
- *Fifth and sixth effective areas define movable walls of third and fourth system volumes*
- *Kobayashi does not include first* ***and second*** *modal resilience volumes, although modal resilience devices are provided*
- *First and fourth system volumes being connected to one diagonal pair of wheel rams and the second and third system volumes being connected to the other diagonal pair of wheel rams*

Thus, in point 13 of the Office Action, the definition of two distinct modal resilience volumes (both partially formed by the first piston rod and both partially formed by the second piston rod) of the present invention cannot be applied to Kobayashi.

Regarding Claim 2, the Examiner alleges that Kobayashi *"further discloses a pressure maintenance device (20, 30 and 40) connected to the first, second, third and fourth system volumes to maintain the static pressure of those volumes at a substantially constant pressure."*

The pressure maintenance devices the Examiner lists from Kobayashi (20, 30 and 40) are modal resilience devices which are provided to supply heave roll and pitch resilience respectively in dynamic motions. These modal resilience devices are not pressure maintenance devices according to the present invention, and do not provide the feature of maintaining static pressure. Furthermore, these modal resilience devices

are not each connected in fluid communication with the respective system volume. To this end, we have amended Claim 2 to clarify that the pressure maintenance devices are "connected *in fluid communication* to the first, second, third and fourth system volumes..." by the fluid communication between the accumulators.

Regarding Claim 3, the Examiner goes on to allege that "the pressure maintenance device (20, 30, 40) of Kobayashi is further connected to the first and second modal stiffness volumes to maintain the static pressure of the modal resilience volumes at substantially the same common pressure (Kobayashi column 9, line 54)". Thus, the Examiner is asserting that the pressure maintenance volume 20 is connected to the modal resilience volume 20, being one and the same, and therefore inconsistent and incorrect.

However to assist clarification we have amended Claim 3 in the same way as Claim 2.

Regarding Claim 4, the Examiner tries to relate the features of Claim 4 (i.e., connection of the system chambers to specific wheels to define LDU modal resilience as acting in pitch) to the system of Kobayashi.

The Examiner asserts that the *"first system volume (40A) is connected to the compression chamber of the...front left wheel assembly"* – whereas in fact Kobayashi discloses a *"front-versus-rear pitching control cylinder 40A"* (column 5, lines 21-22) which comprises chambers 41 and 44 connected to the front left and rear right wheel rams.

The Examiner asserts that the *"second system volume (30B) is connected to the compression chamber of the...back left wheel assembly"* – whereas in fact Kobayashi

discloses *"a right-versus-left rolling cylinder 30B"* (column 4, lines 50-51) which comprises chambers 32 and 33 connected to the front right and rear left wheel rams.

The Examiner asserts that the *"third system volume (40B) is connected to the compression chamber of the...front right wheel assembly"* – whereas in fact Kobayashi discloses *"a front-versus-rear pitching control cylinder 40B"* (column 5, lines 33-34) which comprises chambers 42 and 43 connected to the front right and rear left wheel rams.

The Examiner asserts that the *"fourth system volume (30A) is connected to the compression chamber of the...back right wheel assembly"* – whereas in fact Kobayashi discloses *"a right-versus-left rolling control cylinder 30A"* (column 4, lines 48-49) which comprises chambers 31 and 34 connected to the front left and rear right wheel rams.

The rolling control cylinders 30A and 30B and the pitching control cylinders 40A and 40B disclosed in Kobayashi are therefore clearly not analogous to the four system chambers of the present invention.

In Kobayashi, each rolling or pitching control cylinder includes a piston forming two chambers individually connected to diagonal **pairs** of wheels, so each control cylinder (30A, 30B, 40A, 40B) is connected to the compression chambers of wheel rams in **two diagonally opposite corners** of the vehicle. In contrast, and distinguished over Kobayashi, the four system volumes (of the total of eight chambers or volumes within the load distribution unit – the other four being two pairs of chambers forming two modal resilience volumes) of the present invention are connected to the compression chamber of one or more wheel rams at the wheel assembly for **one corner** of the vehicle.

The Examiner goes on to state *"the first modal resilience volume thereby being a front resilience volume and the second modal resilience volume thereby being a back resilience volume, the front and back resilience volumes thereby providing the damping and stiffness system with additional pitch resilience independent of the roll and heave stiffness of the damping and stiffness system (column 7, line 30)".*

While the paragraph in column 7, lines 30-47 does (around lines 38-42) specify *"the pitching controller 40 including the coil spring 46 (spring element) and the shock absorber 47 (damping element). It is also possible to independently set the characteristics of the respective spring elements and damping elements..."* it is once again clearly not equivalent to the present invention. In Kobayashi the pitching controller piston rod assembly is one piece and that provides the pitch resilience, whereas in the present invention the load distribution unit includes two rods as specified in the claim. When two rods are brought into the interpretation of Claim 1 of the present invention in relation to the Kobayashi system, the rolling controller must also be included. In that case there are then also two modal resilience devices – the pitching controller coil spring 46 and the rolling controller coil spring 36. These are obviously not analogous to the form or function of the first and second modal resilience volumes which act (in the case of Claim 4) in pitch.

Regarding Claim 5, it is directed to the present invention applied to different wheel rams to re-orient the system and thereby change the modal resilience from acting in the pitch mode to acting in the roll mode.

All of the above comments relating to Claim 4 are applicable, and to summarize the differences between the embodiment in Claim 5 over Kobayashi:

The rolling control cylinders of Kobayashi are not equivalent to the four system chambers of the present invention. Each rolling or pitching control cylinder is connected to the compression chambers of wheel rams in **two diagonally opposite corners** of the vehicle. In contrast, the four system volumes (of the total of eight chambers or volumes within the load distribution unit – the other four being two pairs of chambers forming two modal resilience volumes) of the present invention are connected to the compression chamber of one or more wheel rams at the wheel assembly for **one corner** of the vehicle.

If the first and second modal resilience volumes were equivalent to the pitching controller coil spring 46 and the rolling controller coil spring 36 then the LDU of the present invention (which just adds roll resilience in this orientation) would also add pitch resilience which it definitely **does not**.

Regarding Claim 7, Applicants believe that the Examiner has not correctly applied the features of Claim 7 to the figures of Kobayashi (using Kobayashi figure numbering in the text of Kinetic Claim 7). With respect, the Examiner has tried to make the features of Claim 7 read on Kobayashi, but they clearly do not.

In particular, Claim 7 of the present invention clearly defines a device having:

two halves (with connections between the modal resilience chambers), each half comprising:

two primary chambers. two pistons, four secondary chambers consisting of:

two system chambers, and two modal resilience chambers.

Whereas, the pitch and roll modal devices of Kobayashi together comprise:

two hydraulically interconnected assemblies, each assembly comprising:

two primary chambers, two pistons, four secondary chambers consisting of:

four system chambers (all four system chambers in each half of the LDU – which is not the same as the present invention defined in Claim 7)

zero modal resilience chambers (a key point of differentiation between the invention defined in Claim 7 and Kobayashi)

two modal resilience spring and damper assemblies (these additional assemblies are required to control the pistons as there are no modal resilience chambers to do the job. Pressure maintenance is different in the present invention compared to the Kobayashi system).

With respect, Claim 7 is therefore distinguished over Kobayashi.

Regarding Claim 33, the Examiner alleges that Kobayashi further discloses *"resilient centering devices (36 and 46) to provide a centering force biasing the piston-rod assemblies to a mid stroke position."*

The centering devices 36 and 46 of Kobayashi are actually the roll resilience coil spring 36 and the pitch resilience coil spring 46. Both of these also have a respective damper (37 or 47) in parallel because the springs are to provide significantly more than a simple centering force-they provide the resilience in the roll or pitch mode of the suspension system.

In contrast, the centering springs of the present invention defined in Claim 33 are intended to provide a force acting to center the piston rod assemblies at slow speed – the pressure differential in the system chambers caused by the centering force is to

slowly equalize out through the pressure control means which supplies and receives fluid at a very slow flow rate to provide a substantially constant static pressure in the hydraulic volumes over time. However, some form of pressure maintenance would be required for this to make sense. Therefore, the dependency of Claim 33 has been amended to depend on Claim 2.

Thus, Applicants believe Claim 1 patentably distinguishes over the art of record. Likewise, Claims 2-5, which ultimately depend from Claim 1, are also believed to patentably distinguish over the art of record. Claim 7 has been rewritten to independent form and is also believed to be allowable as discussed above. Reconsideration of the rejection is respectfully requested.

Claims 1-6, 8-12, 17, 24, 25, 27-29 and 33 are rejected under 35 U.S.C. § 102(b) as being anticipated by Heyring, et al. (U.S. Pat. No. 6,270,098). Applicants respectfully traverse this rejection.

Here again the Examiner recites Claim 1 (as in points 10-16) with each new paragraph of Claim 1 generating point number from 20-26.

A) separate support means

"the vehicle suspension system also including front and rear vehicle resilient support means between the vehicle body and the wheel assemblies..." in Examiner's report point number 20.

B) provide the primary support of the vehicle body

"wherein the vehicle is primarily supported by the resilience support means" in Examiner's report point number 26.

These features differentiate the present invention from the prior art arrangement by providing for support by means other than the hydraulic system, thereby beneficially permitting:

1. the use of lower pressures in the hydraulic system helping reduce component cost. A higher pressure system requires more components and/or better quality components or additional engineering.

2. the use of a common pressure for all volumes helping reduce control system cost. This allows for a simplified control system adapted to deal with a common pressure rather than needing to accommodate different pressures from different parts of the system.

3. lower pressure differentials across seals to reduce friction and improve ride comfort. Lower pressure differentials across seals results in smoother, less harsh, operation, and therefore improved ride comfort, as well as a quicker reacting system.

Regarding Claim 2, the Examiner states that in Heyring, there is disclosed *"a pressure maintenance device (40, 41) connected to the first, second, third and fourth system volumes to maintain the static pressure of said system volumes at a substantially common pressure".*

However 40 and 41 are pitch resilience devices (accumulators) which are connected to respective pairs of modal (pitch) resilience chambers (30, 31, 32, 33). Those pitch resilience devices (40, 41) are definitely <u>not</u> connected to the system volumes, each system volume subsequently defined (several lines further down the Examiner's own quote) as being connected to the compression chamber of a respective

wheel assembly. That is, the pitch resilience devices 40, 41 of Heyring do not provide the pressure maintenance feature identified by the Examiner.

It is therefore readily apparent that Claim 2 is not anticipated by the Heyring reference since Heyring does not disclose or teach this feature. The pitch resilience devices are not pressure maintenance devices, rather, act to control pitch, and are not connected to the first, second, third and fourth system volumes as defined in Claim 2 of the present invention.

Regarding Claim 3, the Examiner goes on to say *"wherein the pressure maintenance device is further connected to the first and second modal stiffness volumes to maintain the static pressure of the modal resilience volumes at substantially the same common pressure (column 1, line 57)"*.

Heyring at column 1, lines 57-62 describes the fluid communicating interconnection between the two chambers in a pair of "bump" or pitch resilience chambers. The interconnection is required in Heyring to remove warp stiffness of the hydraulic system and thereby permit the load distribution to balance the pressure in the system volumes. This interconnection between pairs of bump chambers to form a "front and back bump" volume (or first and second pitch resilience volumes) does <u>not</u> provide any fluid connectivity between the accumulators 40, 41 and the system volumes.

Regarding Claim 5, Heyring does not disclose roll resilience volumes with additional roll resilience. The inventive concept of rotating the connectivity of the system through 90 degrees with respect to the vehicle to add more roll resilience than pitch resilience, while still keeping all stiffness rates different, is an inventive feature of

the present invention not envisaged or disclosed by the applicant's own US patent to Heyring cited by the Examiner.

Regarding Claim 6, it defines a construction and connection sequence of the load distribution unit. It is related to an additional pitch (rather than roll) resilience application, so is applicable in isolation to the prior art of Heyring. However, if Claim 1 is okay, the objection to this claim should be rendered moot.

However, in order to clearly and unambiguously distinguish Heyring, we have amended independent Claim 6 to include "wherein the vehicle is primarily supported by the resilient vehicle support means".

Regarding Claim 8, in Heyring, the Examiner makes reference to column 1, lines 16-26 to the use of double-or single-acting wheel rams in the earlier Split LDU patent. Given that independent Claim 6 should be found allowable, Claim 8 should also be allowable.

Regarding Claim 24, the front and rear bump (pitch) accumulators 40 and 41 of Heyring are connected to three pitch chambers (see figure 3) or four pitch chambers (see figure 2) by respective passages. These provide pitch resilience to the system and not pressure maintenance. Heyring does not disclose a pressure maintenance device connected to at least four secondary chambers in the load distribution unit.

Consequently, Heyring simply does not disclose or teach the features of Claim 24.

Regarding Claim 25, Heyring discloses damper valves 42, 43 at the mouths of the front bump (pitch) accumulator 40 and rear bump accumulator 41, but there are

never four passages for pressure maintenance devices each having its own damper valve in the passage.

Consequently, Heyring simply does not disclose or teach the features of Claim 25.

Regarding Claims 27-29, all of these objections relate to confusion between pressure maintenance and an accumulator which will provide stiffness dynamically.

Pressure maintenance is not supposed to have any significant effect during cornering. More importantly the pressure maintenance device is (as introduced in Claim 2) provided to maintain the static pressure of the four SYSTEM volumes at a substantially common pressure. If this were done in the prior art, and it is not (as it has no separate support means, instead providing all support of the body through the hydraulic system), then the vehicle could not be leveled with any difference in load.

For example, if there was a roll load offset caused by the driver getting into one side of the vehicle, that roll load would need to be reacted. In a conventional suspension that is done by both the support springs and the anti-roll bars. In the present invention, that is done only by the supporting springs. In Heyring, that is done by the change in load causing a change in pressure in each of the system volumes changing the displacement of the accumulators and producing a displacement of the wheel rams. This is different to a warp displacement where the system has no stiffness. In roll there is a stiffness, which creates a roll couple to react the roll moment change produced by the addition of the load of the driver applied to one side of the vehicle. If the pressure in the four system chambers was maintained to a substantially common pressure, then any change of roll load would result in the car rolling over slowly until the

pressure could be equalized through the body contacting bump stops which then provide the required roll moment to react that provided by the mass of the driver. Embodiments of the present invention therefore include pressure maintenance to maintain static pressure to overcome this problem.

Consequently, Heyring does not anticipate Claims 27-29.

Regarding Claim 33, the resilient centering devices of present Claim 33 are being compared to the pitch fluid bad springs 74, 75, 76 and 77 of Heyring (see figure 4). Again, as those devices provide the modal pitch (or roll) resilience they could be seen as providing a centering force, but without proper pressure maintenance as used in the present invention with a common system volume static pressure that characteristic is irrelevant to the present invention defined in Claim 33.

Consequently, Heyring does not anticipate Claim 33, particularly when Claim 33 depends on Claim 2.

Thus, Applicants believe Claims 1 and 6 patentably distinguish over the art of record. Likewise, Claims 2-5, 8-12, 17, 24, 25, 27-29 and 33, which ultimately depend from one of these independent claims, are also believed to patentably distinguish over the art of record. Reconsideration of the rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 18, 26 and 30-32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heyring in view of Kobayashi. Claims 18, 26 and 30-32 ultimately depend from Claim 6. As discussed above, Claim 6 is believed to patentably distinguish over the art of record. Thus, Claims 18, 26 and 30-32 are also believed to patentably

distinguish over the art of record. Reconsideration of the rejection is respectfully requested.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: February 27, 2008

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